forming liquid crystal so as to be oriented substantially vertically to said first substrate when no voltage is applied across said common electrode and said pixel electrode; and

forming an optically negative compensation film and an optically positive compensation film between said first or second substrate and a polarizing plate, and forming, by a rubbing method, a boundary angle in any one of directions in which liquid crystal molecules are felled when a voltage is applied to said compensation films.

REMARKS

At the outset, the Examiner is thanked for his indication of allowable subject mater in claim 3. By the above amendment, claim 3 is now independent and includes all limitations of claim 1, from which it formerly depended.

Drawing Objections

Examiner has objected to the drawing figures 12A and 12B insofar as they lack a –Prior Art— legend. Such legend has been added to amended figures 12A and 12B, filed herewith under separate cover to the Draftsman.

Examiner has objected to the drawings insofar as the feature "common electrode is formed on the color filter" of claims 3 and 12 are not shown, and has required the feature be shown or deleted from the claims. By the above amendment to claims 3 and 12, the feature has been stricken from those claims.

Examiner has objected to the figures insofar as "liquid crystal before the voltage is applied thereto is oriented substantially vertically to the first substrate" of claims 10

and 25 are not shown. This feature has been added to amended figures 9A and 9B, filed herewith under separate cover to the Draftsman, on the basis of page 29, line 26 through page 30, line 11. No new matter has been added.

Examiner has objected to the drawings insofar as the feature "common electrode is formed on overcoat layer" of claims 4 and 13, are not shown, and has required the feature be shown or deleted from the claims. By the above amendment to claims 4 and 13, the feature has been stricken from those claims.

Examiner has objected to the drawings insofar as the feature "interlayer separation film is formed on the pixel electrode, and the common electrode is formed on the interlayer separation film" of claims 5 and 14, are not shown, and has required the feature be shown or deleted from the claims. By the above amendment to claims 5 and 14, the feature has been stricken from those claims.

Examiner has objected to the drawings insofar as the feature "the common electrode is formed so that the this film transistor, the scan signal electrodes and the video signal electrodes are hidden when viewed from the side of the second substrate" of claims 17 and 18, are not shown, and has required the feature be shown or deleted from the claims. The specification teaches at page 23, lines 1-3, that the common electrode may serve as a light shielding layer, thereby simplifying the manufacturing process. The light shielding layer is taught at page 14, lines 24-26, to be superposed on each film transistor. Figure 5A will be seen to illustrate common electrode 509 overlying the thin film transistor comprising drain electrode 506 and source electrode 507, when viewed from the side of the second substrate. Further, with respect to claim 18, the specification at page 13, line 1 and lines 14-17, teaches the scan signal electrode and video signal

electrode are synonymous with gate electrode and video signal electrode, respectively. Therefore, it is respectfully requested that this objection be withdrawn.

Examiner has objected to the drawings insofar as the feature "optically negative compensation film and an optically positive compensation film are disposed between the first or second substrate and a polarizing plate" of claims 19 and 24-25, are not shown, and has required the feature be shown or deleted from the claims. This feature has been added to amended figure 9A, filed herewith under separate cover to the Draftsman, on the basis of page 41, lines 16 through 23. No new matter has been added.

Examiner has objected to the drawings insofar as the feature "a pre-tilt angles are beforehand formed along two directions/in any one of directions in which liquid crystal molecules are felled when a voltage is applied" of claims 20-21, are not shown, and has required the feature be shown or deleted from the claims. By the above amendment to claims 20-21 and 25, the claim language has been amended to read "the boundary at which the felling direction of the liquid crystal molecules is varied is beforehand formed", consistent with Figures 10A-C and 11A-C and the specification page 30, line 20 through page 33, line 21. No new matter has been added.

Specification Objections

Examiner has objected to the specification insofar as the specification does not disclose the feature "common electrode is formed on overcoat layer" as recited claims 4 & 13; and the feature "interlayer separation film is formed on the pixel electrode, and the common electrode is formed on the interlayer separation film" as recited claims 5 & 14. As noted above, these features have been stricken from the claims.

Examiner has objected to claims 15, 17 and 18 insofar as they fail to further limit the subject matter of a previous claim. Applicant respectfully disagrees and traverses the objection. Claim 15 further limits the form of the common electrode and pixel electrodes in a manner not present in claim 10, from which it depends. The limitation "common electrode commonly uses a part of said common electrode wire" has been stricken from claim 15 as noted above. The recited features "common electrode is formed so that the thin film transistor, the scan signal electrodes and the video signal electrodes are hidden when viewed from the side of the second substrate," of claim 17 is properly taught by the specification. From page 23, lines 1-3, the common electrode may serve as a light shielding layer, thereby simplifying the manufacturing process. The light shielding layer is taught at page 14, lines 24-26 to be superposed on each film transistor. Figure 5A will be seen to illustrate common electrode 509 overlying the thin film transistor comprising drain electrode 506 and source electrode 507, when viewed from the side of the second substrate. Further, with respect to claim 18, the specification at page 13, line 1 and lines 14-17, teaches the scan signal electrode and video signal electrode are synonymous with gate electrode and video signal electrode, respectively. Therefore the claimed limitations of claims 15, 17 and 18 are properly taught and properly limiting of independent claim 10.

Claim Rejections

35 USC §112

Claim 12 stands rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one

skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically the combination of the limitation "liquid crystal before the voltage is applied thereto is oriented substantially vertically to the first substrate" of claim 10; and the recited feature "common electrode is formed on the color filter layer" of claim 12 is lacking.

By the above amendment to claim 12, the recited feature "common electrode is formed on the color filter layer" has been stricken. Applicant respectfully requests Examiner reconsider and withdraw the rejection.

Claims 15, 17-18 stand rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, the recited feature "common electrode commonly uses a part of the common electrode wire" of claim 15 is at issue. By the above amendment, this feature has been stricken from the claim. Applicant respectfully requests the Examiner reconsider and withdraw the rejection.

With respect to the recited features "common electrode is formed so that the thin film transistor, the scan signal electrodes and the video signal electrodes are hidden when viewed from the side of the second substrate" of claims 17-18, the specification teaches at page 23, lines 1-3, that the common electrode may serve as a light shielding layer, thereby simplifying the manufacturing process. The light shielding layer is taught at page 14, lines 24-26 to be superposed on each film transistor. Figure 5A will be seen to illustrate common electrode 509 overlying the thin film transistor comprising drain electrode 506 and source electrode 507, when viewed from the side of the second

substrate. Further, with respect to claim 18, the specification at page 13, line 1 and lines 14-17, teaches the scan signal electrode and video signal electrode are synonymous with gate electrode and video signal electrode, respectively. Therefore, Applicant submits that the limitations of claims 17 and 18 are properly enabled to one of ordinary skill in the art, and respectfully requests the examiner reconsider and withdraw the rejection.

Claims 19-21 and 24-25 stand rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claimed limitation "a pre-tilt angles are beforehand formed, along two directions/in any one of directions, in which liquid crystal molecules are felled when a voltage is applied" of claims 20-21 and 25 has been changed by the above amendment to "the boundary at which the felling direction of the liquid crystal molecules is varied is beforehand formed", consistent with Figures 10A-C and 11A-C and the specification page 30, line 20 through page 33, line 21. No new matter has been added. Applicant respectfully requests the Examiner reconsider and withdraw the rejection.

With respect to the limitation "forming an optically negative and positive compensation film between the first and second substrate and a polarizing plate, and forming, by a rubbing method, pre-tilt angles along two directions in which liquid crystal molecules-are felled when a voltage is applied to said compensation film," the Examiner correctly points out that the specification on pages 9-10, inter alia, discloses an optical compensation film. With respect to the pre-tilt angle, this language had been amended

above to be consistent with terminology used in the specification. The rubbing method of Applicant's selected invention, is disclosed at page 30, line 20 through page 33, line 21.

Claims 4, 5, 13 and 14 stand rejected under 35 USC §112, second paragraph, an being indefinite. As noted above, these claims have been amended to strike the relevant limitations. Applicant respectfully requests the Examiner reconsider and withdraw the rejection.

35 USC § 103

Claims 1-2, 4-5 and 7 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo et al. [US 6,198,520] in view of Ohta et al. [US 6,111,625] and Matsuyama et al. [US 5,689,318]. Applicant respectfully traverses the rejection.

Applicant has disclosed a liquid crystal display device and a method of manufacturing the same that overcomes several weaknesses of those found in the prior art. In particular, Applicant's device comprises a first transparent substrate, a color filter layer disposed on this first substrate, a liquid crystal layer disposed there between, plural scan electrodes, video signal electrodes and scan signal electrodes arranged in matrix form, and plural thin film transistors, formed in association with the crossing points between these sets of electrodes, provided on the first substrate below the color filter layer.

Each pixel is provided with a common electrode that is connected over plural pixels through a common electrode wire to supply a reference potential, and a pixel electrode that is connected to the corresponding thin film transistor and disposed so as to confront the common electrode in the pixel area. The common electrode and pixel

electrode are disposed between the color filter layer and the liquid crystal layer, and further are disposed in different layers through an interlayer separation film formed of a transparent insulating material.

By contrast, Kondo discloses a device in which the color filter is between the pixel electrode and the liquid crystal layer, opposite the orientation of the claimed invention. Examiner's reading of Kondo that "said common electrode (2) and the pixel electrode (3) disposed between the color filter and the liquid crystal layer" is in error. In each cross section shown by Kondo, Figs. 1, 2, 8b, and 11, the color filter layer (5) is disposed between the liquid crystal layer (10) and both the common (2) and pixel (3) electrodes.

As disclosed in the specification beginning at page 6, line 14, if the electric field which is formed between the source electrode and the common electrode passes through the color filter, pigments constituting the color filter layer store charges, which are then applied to the liquid crystal elements adjacent them, adversely effecting display performance. This feature of the present invention is neither taught nor fairly suggested by Kondo. Neither Ohta nor Matsuyama corrects this deficiency.

With respect to the relative positions of the electrodes and the color filter, the structure of Ohta (See Fig. 2) is typical of that disclosed by Applicant as prior art. Ohta's counter, or common, electrodes (CT), and pixel electrodes (PX) are disposed on the opposite side of the liquid crystal layer (LC) from the color filter (FIL(G)). Similarly, a cross section of the device disclosed by Matsuyama (Fig. 10b) shows structure in accordance with the prior art in this regard, not according to the preset invention.

Applicant submits that all claim limitations are not taught by Kondo, taken alone or in combination with Ohta and/or Matsuyama.

The claims not addressed above are rejected by the Examiner citing Zhang, et al. [US 6,097,454], Kim et al. [US 6,005,650], Xu et al. [US 6,023,317], Ishikawa et al. [US 5,677,747], and Murai et al. [US 6,160,604]. Applicant respectfully traverses the rejection.

None of the references applied to further dependent claims correct the noted deficiency of Kondo in view of Ohta and Matsuyama.

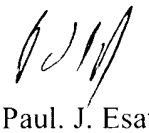
Zhang makes no mention of a color filter layer. In describing the prior art (Col. 3, lines 56-59), Kim discloses "color filter layers... are arranged on the inner surface of the upper substrate". Kim offers no teaching or suggestion to modify this arrangement. Xu teaches the use of positive and negative retardation films for improving display contrast. Likewise, Ishikawa (Fig. 1) does not teach or suggest a color filter or its position relative to the electrodes (3c, 3d). Murai teaches that liquid crystal contains small amounts of organic polymer.

Finally, Applicant submits that the aggregate total of the relevant Prior Art cited by the Examiner lacks teaching or suggestion of all the claimed limitations.

Conclusion

In light of the foregoing, Applicant respectfully requests the Examiner reconsider and withdraw the rejection of all claims. Applicant further submits that the claims define patentable subject matter, and a notice of allowance is respectfully solicited. If the Examiner feels there are any outstanding issues, please contact the undersigned by telephone if it is believed that doing so will expedite prosecution.

Respectfully Submitted,



Paul. J. Esatto, Jr.
Registration No. 30,749

Scully, Scott, Murphy & Presser
400 Garden City Plaza
Garden City, New York 11530
(516)742-4343 (Voice)
(516)742-4366 (Facsimilie)

PJE/DJT:eg

Appendix A

MARKED-UP VERSION OF AMENDED CLAIMS

3. (Amended) A [The] liquid crystal display device [as claimed in claim 1,] having a transparent first substrate, a transparent second substrate, and a liquid crystal layer and a color filter layer sandwiched between said first and second substrates, comprising:

said color filter layer disposed on said first substrate;

said liquid crystal layer disposed between said color filter layer and said second substrate;

plural scan signal electrodes, video signal electrodes for crossing said scan signal electrodes in a matrix form, and plural thin film transistors in association with the crossing points between said scan signal electrodes and said video signal electrodes provided on said first substrate below said color filter layer;

at least one pixel formed in each of areas surrounded by said plural scan signal electrodes and said video signal electrodes;

each pixel provided with a common electrode which is connected over plural pixels through a common electrode wire to supply reference potential, and a pixel electrode which is connected to the corresponding thin film transistor and disposed as to confront said common electrode in said pixel area; and

said common electrode and said pixel electrode disposed between said color filter layer and said liquid crystal layer;

wherein said common electrode and said pixel electrode are disposed in different layers through an interlayer separation film formed of transparent insulating material,

wherein electric field having a component which is dominantly parallel to said first substrate is produced in said liquid crystal layer by applying a voltage across said common electrode and said pixel electrode, and liquid crystal before the voltage is applied thereto is oriented substantially parallel to said first substrate; and

wherein [said common electrode is formed on said color filter,] said interlayer separation film is formed on said common electrode, and said pixel electrode is formed on said interlayer separation film.

4. (Amended) The liquid crystal display device as claimed in claim 1, wherein an overcoat layer for protecting said color filter layer is formed on said color filter layer, [said common electrode is formed on said overcoat layer,] and said interlayer separation film is formed on said common electrode, and said pixel electrode is formed on said interlayer separation film.

5. (Amended) The liquid crystal display device as claimed in claim 1, wherein an overcoat layer for protecting said color filter layer is formed on said color filter layer, and said pixel electrode is formed on said overcoat layer. [, said interlayer separation film is formed on said pixel electrode, and said common electrode is formed on said interlayer separation film.]

12. (Amended) The liquid crystal display device as claimed in claim 10, wherein [said common electrode is formed on said color filter,] said interlayer separation film is formed on said common electrode, and said pixel electrode is formed on said interlayer separation film.

13. (Amended) The liquid crystal display device as claimed in claim 10, wherein an overcoat layer for protecting said color filter layer is formed on said color filter layer, [said common electrode is formed on said overcoat layer,] and said interlayer separation film is formed on said common electrode, and said pixel electrode is formed on said interlayer separation film.

14. (Amended) The liquid crystal display device as claimed in claim 10, wherein an overcoat layer for protecting said color filter layer is formed on said color filter layer, and said pixel electrode is formed on said overcoat layer [, said interlayer separation film is formed on said pixel electrode, and said common electrode is formed on said interlayer separation film].

15. (Amended) The liquid crystal display device as claimed in claim 10, wherein said common electrode is formed in a grid shape so as to surround a pixel; and said pixel electrode is disposed so as to traverse the pixel [; and said common electrode commonly uses a part of said common electrode wire].

20. (Amended) The liquid crystal display device as claimed in claim 19, wherein the boundary at which the felling direction of the liquid crystal molecules is varied is [a pre-tilt angles are] beforehand formed along two directions in which liquid crystal molecules are felled when a voltage is applied.

21. (Amended) The liquid crystal display device as claimed in claim 19, wherein the boundary at which the felling direction of the liquid crystal molecules is varied is [a pre-tilt angle is] beforehand formed in any one of directions in which liquid crystal molecules are felled when a voltage is applied.

25. (Amended) A method of manufacturing a liquid crystal display device comprising a first substrate, a second transparent second substrate, and a liquid crystal layer and a color filter layer sandwiched between said first and second substrates, comprising the steps of:

forming said color filter layer on said first substrate;

forming said liquid crystal layer between said color filter layer and said second substrate;

forming, on said first substrate below said color filter layer, plural scan signal electrodes, plural video signal electrodes crossing said scan signal electrodes in a matrix form, and plural thin film transistors in association with the crossing points between said scan signal electrodes and said video signal electrodes;

forming at least one pixel in each of areas surrounded by said plural scan signal electrodes and said video signal electrodes;

forming, in each pixel, a common electrode which is connected over plural pixels through a common electrode wire to supply reference potential, and a pixel electrode which is connected to the corresponding thin film transistor and disposed as to confront said common electrode in said pixel area;

disposing said common electrode and said pixel electrode between said color filter layer and said liquid crystal layer, and disposing said common electrode and said pixel electrode in different layers through an interlayer separation film formed of transparent insulating material;

forming liquid crystal so as to be oriented substantially vertically to said first substrate when no voltage is applied across said common electrode and said pixel electrode; and

forming an optically negative compensation film and an optically positive compensation film between said first or second substrate and a polarizing plate, and forming, by a rubbing method, a boundary [pretilt] angle in any one of directions in which liquid crystal molecules are felled when a voltage is applied to said compensation films.